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ABSTRACT

The Hartsville, Tennessee nuclear reactor site, the coal plant at Wheatland, Wyoming, and the nuclear plant at Skagit, Washington have mitigation plans developed in response to a federal, state, and local regulatory agency, respectively; the three mitigation plans aim at internalizing community-level social costs and benefits during the construction phase of large new energy supply facilities. Among the social costs included in the mitigation plans are public and private sector services such as schools, utilities, planning, public safety, transportation, housing, and community services at power generation construction sites. Viewed as new institutional responses to social impact mitigation planning, the plans have both variances and similarities in terms of origins, goals, scope, local participation, financing and costs, adequacy and significance. The plans are highly significant because of their pioneer status, their similarity of scope despite highly diverse regulatory environments, and their custom tailoring to local circumstances. Policies providing impetus for comprehensive assessment of the effects of public development projects, including the National Environmental Policy Act of 1969, court rulings, and various state laws, are presented. (Author/NEC)

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MITIGATING COMMUNITY IMPACTS OF ENERGY DEVELOPMENT: SOME EXAMPLES FOR COAL AND NUCLEAR GENERATING PLANTS IN THE UNITED STATES*

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MITIGATING COMMUNITY IMPACTS OF ENERGY DEVELOPMENT: SOME EXAMPLES FOR COAL AND NUCLEAR GENERATING PLANTS IN THE UNITED STATES

Abstract

Three mitigation plans aimed at internalizing community-level social costs are examined at TVA's four-unit nuclear plant in Hartsville, Tennessee, Puget Sound Power and Light's two-unit nuclear plant in Skagit, Washington, and Missouri Basin Power Project's three-unit coal plant in Wheatland, Wyoming. Viewed as new institutional responses to social impact mitigation planning, these plans are analyzed in terms of their origins, scope, goals, local participation, financing, and costs. The significance of the plans derives from: 1) their pioneer status; 2) their similarity of scope despite highly diverse regulatory environments; and 3) their custom tailoring to local circumstances.

BIOSKETCH

Elizabeth Peelle

Elizabeth Peelle is a chemist-turned-sociologist (MA - University of Tennessee, 1964) who initiated the development of social impact assessment at Oak Ridge National Laboratory. She is a research staff member and former group leader of the Social Impact Assessments group. Her current interests are the comparative social costs of coal and nuclear fuel cycles and community mitigation planning.

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MITIGATING COMMUNITY IMPACTS OF ENERGY DEVELOPMENT

The objective of this paper is to examine selected cases of community-level dissociations of costs and benefits from large new energy supply facilities and how they have been internalized through specific mitigation plans for the construction period. New institutional arrangements are being devised and new requirements are being made at local, state, regional, and federal levels in response to these dissociations of cost and benefits from large energy development projects. The policy framework for these new arrangements will also be briefly discussed. Three examples of these new institutional responses will be analyzed and compared in terms of origins, goals, scope, local participation, financing and costs, adequacy and significance. The three examples represent mitigation plans developed in response to a federal, state, and local regulatory agency, respectively: TVA's Hartsville, Tennessee nuclear reactor site (Nuclear Regulatory Commission); the Missouri Basin Power Project or Laramie River Station at Wheatland, Wyoming (Wyoming Industrial Siting Administration); and Puget Sound Power and Light's Skagit nuclear reactor (Skagit County, Washington).[1]

I. Definitions of Social Costs and Externalities

The costs and benefits of energy production are increasingly subject to public questioning and scrutiny in recent years. Energy production, once an unquestioned "good" in United States society, is increasingly evaluated in terms of comparative costs, and dissociations of costs and benefits.[2] Many economic comparisons of the costs of generating electricity by either coal combustion or nuclear fission have been made in the last decade by electric utilities, regulators, and the nuclear industry. However, community social costs of the type to be considered in this article are generally not included.

Economists have typically excluded social costs or considered them only as "externalities" -- effects incidental or external to the main production-consumption processes with which economics is concerned. The task of rationalizing these economic effects as "exceptional cases" external to a decision-maker's balance sheet is usually relegated to the field of welfare economics as developed by A. C. Pigou, in his *Economics of Welfare*. For a different view developing the thesis that social costs are not minor exceptions to the rule, but are typical phenomena which challenge basic economic assumptions, see K. William Kapp, *The Social Costs of Private Enterprise*, 1971.

Social costs are defined by K. W. Kapp as all direct and indirect losses suffered by third persons or the general public as a result of private economic activities.[3] The social costs considered in this paper are a limited but quantifiable subset of this much larger category. We will include only public and private sector services such as schools, utilities, planning, public safety, transportation and housing, or community services costs at power generation construction sites, such as are included in these mitigation plans. Not included are numerous other social costs such as changes in personal roles, community structure and social institutions which accompany the process of urbanization stimulated by energy development.[4]

Ideally, the costs and benefits of any given project should be borne equally by the same parties, or at least the costs should be incurred by any given party in the same measure as benefits are received. In fact, the shifting of costs to third parties or to society in general is common. That this "dissociation of costs and benefits" is increasingly recognized is attested to by the increasing litigation, burgeoning administrative regulations and other delays which characterize the energy facility siting process. It is the author's

belief that prompt action by utilities to "internalize" these externalized costs will assist in (1) closing some of these dissociation gaps and (2) reducing facility siting delays.

Dissociations of costs and benefits occur for many reasons and appear in various forms. They occur whenever those who benefit from a project (e.g., the producers and users of the power) do not pay its full costs. Dissociations may occur if the beneficiaries are not the same as the "benefactors" or payers of the costs,[5] as when the two are separated by time (present vs. future generations), space (construction village vs. power users located elsewhere), or by vagaries of institutional structure (a county or state line artifically dividing an impacted area into jurisdictions receiving and not receiving tax payments from an energy facility).[6] Who gets the benefits and who pays (or should pay) the costs remains the central equity question for assessments of social impacts resulting from energy development.

The dissociations of costs and benefits of interest to this analysis are those which occur within the region of a power plant site, especially during the construction period. In those cases, the beneficiaries of the energy development project are numerous and usually distributed over a wide geographic area, often some distance away from those few who pay the costs of sudden, temporary community growth in a small area surrounding the site. Provision of community services is almost entirely a function of local governments in the United States. Thus, the sudden and substantial community development costs associated with the large workforces required for the construction of modern energy facilities may therefore fall entirely upon small jurisdictions ill-equipped with the administrative capability or revenue base to respond effectively.[7] Yet these burdens are seldom included in the cost accounts of the project that necessitates these new activities.

II. The Policy Basis for Mitigation of Impacts

The major impetus for a more comprehensive assessment of the effects of public development projects is the National Environmental Policy Act of 1969 (NEPA).[8] While the outlines of the act are broad, sweeping, and often non-specific, the wording strongly expresses the intent that environmental, social, and "non-technical" factors be included in decision-making along with economic and technical factors. Selected quotes pertinent to the inclusion of social factors are given in Table 1.

NEPA has been interpreted in the final regulations of the Council on Environmental Quality[9] to require appropriate mitigation measures (Sec. 1502.14f) and that environmental impact statements discuss means to mitigate adverse impacts (Sec. 1502.16h). Mitigation is defined to include actions which avoid, minimize, rectify, reduce or eliminate, or compensate for impacts (Sec. 1508.20). Five other references to mitigation are made in connection with monitoring and enforcement programs, lead agency responsibility for mitigation, and obligation of (objecting) agencies to specify necessary mitigation measures when expressing a complaint or reservation, among others.

The federal courts and regulatory agencies have interpreted NEPA as granting authority for imposing conditions to mitigate the adverse social and environmental impact of proposed facilities, as in the *Calvert Cliffs Coordinating Committee Vs. United States Atomic Energy Commission*, 449 F. 2d 1109 (D.C. Cir. 1971) and Detroit Edison Company (Greenwood Energy Center), Atomic Licensing Appeal Board-247, 8 AEC 936, 943 (1974).[10] In the Calvert Cliffs decision, the court said: "Clearly it is pointless to 'consider' environmental costs without also seriously considering action to avoid them. Such a full exercise of substantive discretion is required at every important, appropriate, and nonduplicative stage of an agency's proceedings."

Table I

Social Requirements

National Environmental Policy Act of 1969

102(A)	. . . "Systematic, Interdisciplinary Approach (to) Insure Integrated Use of the Natural and Social Sciences . . . in planning or decision making."
102(B)	"identify and develop methods and procedures (to) insure appropriate consideration (of) presently Unquantified Environmental Amenities and Values in decision making along with economic and technical considerations."
102(D)	"study, develop, and describe appropriate alternatives . . . in any proposal (involving) UNRESOLVED CONFLICTS or ALTERNATIVE USES of available resources." (emphasis added)

In addition to the above rulings affecting the Nuclear Regulatory Commission (NRC), the Federal Power Commission (FPC)* has confirmed an initial licensing decision for the Bath County (Virginia) Pumped Storage Project (September 1976) which says that Virginia Electric and Power Company's license shall "be conditioned to require the licensee to extend financial assistance to Highland County to mitigate the impact upon the County...resulting from the influx of project workers, their families and others..." in five areas of public sector services including education, law enforcement, solid waste disposal, general government costs, and welfare and other social services.[11] In the opinion of one of the attorneys involved in the FPC case, "the decision is significant because it means that, along with the Hartsville decision, the two federal agencies primarily responsible for licensing electric generation plants have now required license applicants to help mitigate the socioeconomic impacts of the projects they propose."[12]

Recently, other federal legislation has been passed or proposed to provide mechanisms and funding for mitigating socioeconomic impacts caused by energy development projects. The 1976 amendments to the Coastal Zone Management Act which affect 30 states, provide $1.6 billion ($1.6 \times 10^9$ dollars) in federal assistance (loans and loan guarantees) for public services, roads, and water facilities for coastal communities affected by energy development.[13] For the past three years, Congress has considered but not passed energy impact assistance legislation (1976-1978). These bills would have typically provided assistance in the form of loans, loan guarantees, and planning grants to states, local government units and Indian tribes for "extraordinary fiscal impacts" resulting from development of (inland) energy resources. The 1978 act also

*FPC is now part of Department of Energy since 1977 reorganization.

provided for the creation of impact assessment teams of local, state, and federal officials responsible for developing impact mitigation plans.[14]

At the state level, a variety of laws have been passed in the last few years which require assessment and mitigation of socioeconomic impacts as a pre-condition for siting, or which provide funding and/or enabling mechanisms for minimizing or mitigating impacts. The siting laws of Wyoming and Washington belong in the former category, while the Wyoming Joint Power Act, the Utah law on early tax payments for energy development projects, or the North Dakota coal privilege tax on coal conversion facilities are representative of the latter group.

III. Three MITIGATION PLANS: Hartsville, Skagit, and Wheatland

In the rest of this paper , I will discuss the three impact mitigation plans and their implications for more comprehensive social cost accounting. The three plans are similar in a number of ways. All arose because of intense local concern about the potential imbalance of costs and benefits from a proposed energy development project, all have been formalized in further agreements and/or licensing proceedings, and all are newly implemented or proposed plans whose adequacy remains to be evaluated through future implementation. Two of the plans (Hartsville and Wheatland) are in the early stages of implementation; the Skagit plan is still pre-operational.

Project differences among the three cases are shown in Table II where construction costs range from approximately $1.4 billion ($1.4 \times 10^9$ dollars) for the Wheatland coal project to approximately $3.5 billion ($3.5 \times 10^9$ dollars) for the four-unit Hartsville nuclear plant. The planned power output varies from 1500 Mw of electrical power at Wheatland, to 2600 Mw of electrical power

Table II

Project Characteristics

	Hartsville, Tennessee	Skagit County Washington	Wheatland, Wyoming (Laramie River)
Fuel	Nuclear	Nuclear	Coal
Size	4-unit 1269 Mw of electrical power (each)	2-unit 1300 Mw of electrical power (each)	3-unit 500 Mw of electrical power (each)
Cost	$\sim\$3.5 \times 10^9$	$\sim\$1.9 \times 10^9$	$\sim\$1.4 \times 10^9$
Utility	TVA	Puget Power and Light	Missouri Basin Power Project
Licensing Agency	NRC	NRC Wash. EFSEC Skagit County	Wyoming Industrial Siting Administration
Status	Under construction NRC Permit 1977	NRC permit pending State permit received Jan., 1977 County rezone agreement-1974	Under construction State permit 1976

at Skagit, to 5076 Mw of electrical power for Hartsville. The sponsoring utilities include the nation's largest public utility, the Tennessee Valley Authority; a consortium of six rural electrification cooperatives which have formed the Missouri Basin Power Project in order to build the Wheatland plant; and a privately-owned utility, Puget Sound Power and Light.

The licensing or regulatory authority responsible for the mitigation plan includes a federal agency (NRC — Hartsville), a state siting agency (Wyoming Industrial Siting Administration — Wheatland), and a local (county) unit (Skagit County Commissioners). Construction is well underway at Hartsville and Wheatland, but not at Skagit. Whereas the local contract rezone agreements were formalized in 1974 and various state permits were obtained in January, 1977, the federal (Nuclear Regulatory Commission) permit required at Skagit has not yet been received.

A. Origins of Plans

While all three mitigation plans arose from local concerns about socio-economic siting issues, the three cases differ considerably in detail. In the Hartsville case, four public bodies (as well as several private individuals) were active in NRC licensing proceedings on community and public services issues. Intervenors included the Town of Hartsville, Trousdale County, the City of Nashville, and the State of Tennessee. Regional development districts participated extensively in discussions with TVA and the NRC, but did not formally intervene. After detailed environmental impact assessments and hearings, the NRC licensing board conditioned approval of a Limited Work Authorization on TVA's proposed mitigation plan as well as additional NRC staff proposals requiring monitoring, evaluation, and reporting of the effectiveness of the mitigation plan on a semi-annual basis during construction and until 18 months after the last operating license is issued.[15]

The Skagit contract Rezone Agreement was developed when the county declined to rezone the proposed Skagit nuclear plant site in violation of its master plan. More than 35 conditions were accepted by Puget Power and Light in the subsequent contract rezoning agreement, including three socioeconomic impact mitigation conditions.[16] The Washington State Energy Facility Siting Evaluation Council (EFSEC) has since incorporated these conditions, including a monitoring plan, in its own license. Additional features of the EFSEC license include requirements that Puget Power and Light (1) provide land for temporary housing if needed, (2) pay any valid claims arising from project impacts upon any state agency or local political jurisdiction and (3) submit any disputes arising from these provisions to EFSEC for decision.[17] Thus impact mitigation responsibility is broadened to include other areas outside of Skagit County which were not covered in the original contract rezone agreement.

At Wheatland, an extensive list of conditions for mitigation was proposed in the utility's environmental impact statement and application before the Wyoming Industrial Siting Council. The application was contested by several citizen groups, the Sierra Club, the Farm Bureau, Livestock Association, conservation and reservoir groups, among others. The license issued by the WISA included numerous conditions requiring financial assistance by Missouri Basin Power Project to public and private service entities in the Wheatland impact area.[18]

B. Goals

The goals of the mitigation plans vary, as shown in Table III, from "reducing impacts...upon present and expected inhabitants" (Wheatland) to "reasonably and adequately mitigate the impacts of the construction of the project on the community" (Skagit) to TVA's Hartsville statement: "to provide

Table III

Goals of Mitigation Plans

I. "The applicant shall take the necessary mitigating actions as identified within the application and the hearing record, to reduce the socioeconomic impacts of the facility upon present and expected inhabitants." (Wheatland, Wyoming)

II. "To reasonably and adequately mitigate the impacts of the construction of the project on the community and protect the health and safety of the public during construction and operation." (Skagit, Washington)

III. "To utilize local capabilities to the extent possible; to provide assistance to the impact communities sufficient to maintain pre-project service levels or generally accepted standards; to enhance, to the extent possible, long-term benefits from mitigation projects; to ensure coordination with appropriate bodies; and to provide necessary facilities and services in a timely and cost-effective manner." (Hartsville, Tennessee)

assistance to the impact communities sufficient to maintain pre-project service levels or generally accepted standards." Only one of the goal statements (Hartsville) suggests baseline criteria against which to measure mitigation efforts. These criteria are maintenance of "preproject service levels or generally accepted standards." The others go no further than general statements such as "protecting the health and safety of the public by "reasonably and adequately" mitigating the impacts. The Wheatland statement mentions "present and expected" residents as the group of concern, the only one to broaden the "community" to include construction workers as well as present residents.

In general, the Hartsville plan's goals are most detailed and include a number of significant sub-goals such as timeliness, coordination with other bodies, using local capabilities, and enhancing long-term benefits from the mitigation project. Though the plans themselves and other information suggest that the timing of the assistance is recognized as a significant factor, only the Hartsville plan lists timeliness of impact assistance as a specific goal.

C. Scope

Both the Hartsville and Wheatland plans are detailed, multi-purpose plans covering a large number of local public and private sector needs as shown in Table IV. Both provide assistance or financial help for education, water and sewage systems, health and medical services, local government budgets, planning and coordination, housing, and resident training. The TVA plan also includes an elaborate employee transportation plan involving buses, van pools and car pools. Mental health and social services, recreation, roads, and law enforcement are also included in the Wheatland plan, making its scope the most

Table IV
Scope — Features of Mitigation Plans

	Hartsville	Skagit	Wheatland
Education Costs	X	X	X
Water and Sewage	X		X[1]
Mental Health and Social Services			X
Health and Medical	X		X
Local Government Budget	X		X
Planning and Coordination	X		X
Recreation			X
Law Enforcement	X	X	X
Housing	X Limited		X
Employee Transportation	X		
Resident Training	X		X
Roads			X
Monitoring	X[2]	X[3]	X[4]

[1]Also electrical.
[2]Twice yearly reports to NRC, state.
[3]Monthly and quarterly monitoring with "regular reporting" to state.
[4]Monthly reports to county; yearly evaluation by state.

comprehensive of the three. The Skagit contract rezoning agreement provides only for coverage of education and law enforcement costs. All three plans include some sort of monitoring provision.

D. Local Participation

The TVA-created Hartsville Project Coordinating Committee involves 21 area mayors and county officials in a five-county impact area who meet quarterly to discuss, evaluate, and recommend actions to TVA concerning socioeconomic impacts. TVA supports a local office and staff for the HPCC up to $50,000 per year. The TVA on-site community coordinator is the principal contact and intermediary for citizens and local officials. Final decisions on money and allocations for the mitigation program are made by TVA upon the recommendation of TVA's community coordinator.

In contrast to the HPCC, the Wheatland Project Area Coordinating Council was established by a state regulatory agency (WISA) with the power to review required monthly reports from the Missouri Basin Power Project, evaluate the socioeconomic monitoring program, and implement needed contingency measures. MBPP established a local task force two years ago whose 10 subcommittees studied impacts and inventoried local capability as a basis for MBPP's environmental impact reports. The task force's present functions are primarily information transfer. MBPP supports the PACC up to $10,000 per year.

At Skagit, public participation is minimal but vested with clear authority when it does occur. A three-person committee of Chief of Police, Sheriff, and Judge determines the Puget Power and Light payment for law enforcement, while a three-person arbitration board (one appointee chosen by Puget) has final power to settle any disagreements between Puget and the school districts over the formula-derived education payments.

E. Financing and Costs

Nowhere is variability more pronounced between the three mitigation plans than in financing and costs (Table V). TVA's current estimate of $10 million for its total construction-period plan has increased from initial estimates of $5-6 million. Puget Power and Light's estimate for costs in the peak year only ranges from $125,000 to $600,000. The Wyoming Industrial Siting Board estimate of total MBPP mitigation costs is approximately $19.3 million. About $15 million of this is potentially recoverable if the housing project is sold as anticipated, if the school district chooses to buy the new schools when its assessed valuation increases, if the Farm Loan Board agrees to fund road costs, etc. Net costs to MBPP may therefore range from $4 to $19 million.

Modes of payment include direct payments by all three, with technical assistance supplied by both TVA and MBPP. TVA also guarantees cost recovery to local governments in the housing area. The Wheatland plan, being the most elaborate, also uses loan guarantees, outright grants, and operating budget guarantees.

All of Puget's payments are prepayments of taxes against a future operational tax bill estimated to be around $30 million per year. The Skagit plant will triple the county's assessed valuation, from $1 billion ($1 \times 10^9$ dollars) to about $3 billion[19] ($3 \times 10^9$ dollars).

As a federally-chartered utility, TVA pays no local taxes and minimal local in-lieu of tax payments, though it makes substantial payments on gross revenues to the seven states which it serves.* The Missouri Basin electric cooperatives

*One result of the Hartsville experience is that legislation was passed in the 1978 session of the Tennessee Legislature to distribute more of the state's receipts from TVA to local areas. Provided that total revenues increase, "impact counties" in 1979 will share in 3% of gross revenues, with the remainder divided among the state (48 1/2%), counties and municipalities. (House Bill #288, Tenn. Gen Assembly, 1978).

Table V

Financing and Costs of Plans

	Hartsville	Skagit	Wheatland
Mode of payment or support	Direct payments Technical assistance Guarantees of cost recovery Supplementary funding	Prepayment of taxes	Direct payments Technical assistance Loan guarantees Outright grants Operating budget guarantees
Authority to determine payment amounts	Agreement formulas (education) Utility	Agreement formulas (education) with binding arbitration Law enforcement Comm.	Permit conditions Project Area Coordinating Council
Cost to Utility	$\sim\$10. \times 10^6$ (total)	\$125,000 - \$600,000 (for peak year)	$\sim\$19.3 \times 10^6$ (total)
Potentially recoverable costs	—	—	$\sim\$15.0 \times 10^6$
Local taxes	Non-taxable	$\sim\$30 \times 10^6$ (operation)	$\sim\$2.3 \times 10^6$ (1976-1983) use tax 460% assessed value increase (Platte Co.) 560% assessed value increase (School District #1)
Cost per kilowatt hour	0.03 mills[1]	0.033 mills[2]	0.18 mills[3]

[1]Calculated on basis of fixed charge rate of 8.5% and 60% plant capacity factor.
[2]Using fixed charge rate of 18% and 60% plant capacity factor.
[3]Using fixed charge rate of 8.5% and 70% plant capacity factor.

will be making both substantial mitigation payments and substantial tax payments to local governments. During construction, MBPP use tax payments are expected to reach $2.3 million. Though estimates of ad valorem taxes during operation are not available, some estimate of the increased tax base expected can be gained from the 400-500% increases in assessed valuation projected for Platte County and School District #1[20] (See Table V).

F. Adequacy

While it is premature to evaluate the adequacy of mitigation plans which are not yet fully implemented, reviews of the pertinent environmental impact statements and hearing records indicate that the three plans cover most potential impacts identified by the impact assessments conducted. All three have monitoring provisions which will enable on-site review and adjustment of mitigation programs during the construction period. It is not clear at this time what effects, if any, will result from the limited public participation and decision-making power allowed in the TVA-Hartsville plan, or the greater public participation and authority of the Wheatland plan. Are the structures and arrangements adequate for truly mitigating impacts and resolving disagreements which may arise between citizens, officials, and the utility? Time will permit evaluation of these questions and the functioning of the mitigation plans themselves.

IV. Conclusions

The Hartsville, Wheatland and Skagit socioeconomic impact mitigation plans are highly significant because they represent the first of many such plans and arrangements which are likely to accompany future energy development projects. Their extensive scopes and significant costs are signposts toward a future

which considers community level social and economic costs as part of the normal, direct costs of development projects. Since these costs represent a direct transfer of "externalities" into the production cycle, such transfers help to reduce the dissociation between costs and benefits discussed earlier. In addition to the improvements in equity which result from reducing some of the dissociations between costs and benefits, these plans have other advantages:

1) they reduce the paralyzing uncertainties surrounding facility siting, enabling specific actions by local communities to deal with impact problems;
2) they reduce delays which result from unresolved socioeconomic issues;
3) through monitoring of impacts they provide an urgently needed data base for improving future socioeconomic impact predictions and mitigation plans.

The variability in the mitigation plans represents their custom tailoring to specific sites as well as their very different regulatory and institutional environments. Their similarities in scope and intent are more remarkable in view of these wide differences. It would seem desirable at this stage to encourage such custom tailoring. Goals may be similar but mechanisms may vary. What institutional arrangements are most conducive to custom tailoring and accountability? What characteristics of mitigation plans encourage more adequate achievement of their objectives? These cases, if followed over time, should help to answer such questions.

Though none of the goal statements recognize it, these plans illustrate each of two major approaches to impact management. The two approaches are: 1) minimization or reduction of inputs which cause troublesome impacts and 2)

mitigation or alleviation of damage caused by impacts.[21] Somewhat different courses of action are implied by these two objectives, as illustrated in the following example. The size and rate of entry of a construction workforce is a prime cause of impacts, one of four principal "inputs" to a community.[22] Impacts from the workforce could be minimized or reduced by reducing the size of the workforce (a "workforce ceiling"), limitations upon the rate of entry to the community, or employee transportation plans. In this case, action is taken directly upon the input causing the impacts. In the second case, the impacts caused by the entry of the workforce (e.g., large increase in demand for all community services and housing) are dealt with individually by assistance to each of the affected areas.

All of the plans discussed herein use the second approach of impact mitigation, and TVA and MBPP use both impact mitigation and input reduction. Seven of the Hartsville plan features are mitigative (education, water and sewage, health, local government budget, planning and coordination, law enforcement and housing) while two (employee transportation and resident training) are input reducers. If fewer employees are in-movers, all impacts except traffic will be reduced. Early Hartsville monitoring reports[23] reveal the possible unexpected success of the latter two components of the mitigation plan, since in-mover rates to the immediate impact area are half of what had been projected.* Thus impacts on the housing and services sector are likewise much below what had been predicted. At Wheatland, Basin Electric agreed to a workforce ceiling of 2250 (later reduced to 1770 for first year)[24] as well as the extensive list of impact alleviation actions.

*Another hypothesis for the low in-mover rates is the large difference in housing availability in the affected counties.

It would appear that input reducer plans (for "troublesome" inputs only)* are likely to be less costly, at least in the more densely populated East, than the elaborate and expensive "impact repair" plans as seen at Hartsville and Wheatland. Clearly, both impact management strategies can be combined where appropriate as at Hartsville and Wheatland for an approach which is both more flexible and effective. In the West, where energy boom towns are commonplace and impacts are difficult to control because of the sparse population and simultaneous development by more than one energy company, there appear to be fewer options and less opportunity to use "input reduction" as a tool. In any event, the growing impact management needs of energy developers and host communities would be well served by further analysis and conceptual clarification of possible strategies.

The three plans reviewed here also illustrate a further difference in mitigation approaches: that between compensation for impacts and fiscal incentives which are not directly tied to impacts. In the first case, as in Hartsville, compensation occurs only as a direct result of expected and/or measured impacts, and is viewed as compensation for damages inflicted or expenses incurred as a direct result of the project. No compensation above the minimum needed to remedy local costs is intended.

In the second case, various fiscal incentives for local jurisdictions are present as a result of local and state taxing arrangements (of utilities, in-movers, business activity, etc). In the case of Skagit, the utility expects to make substantial yearly tax payments ($30 million) when in operation, regardless of the presence/absence or intensity of any socioeconomic impacts the

*Not all impacts are troublesome, and reducing the "money" input would only impede impact mitigation in general, by reducing the principal means of alleviating services needs.

project creates. It was commonly assumed in early environmental impact statements that any socioeconomic impacts caused by a tax-paying utility would be fully and automatically compensated by the payments of (often substantial) taxes during operation. Experience has identified numerous uncompensated impacts in these situations, however, such as the dissociations of costs and benefits mentioned earlier. Hence, some licensing agencies have mandated additional compensatory payments (such as at Skagit[25] and Wheatland) to fill in (fiscal) gaps not covered by normal taxing arrangements. These two plans may be considered combined compensatory-incentive arrangements while that at Hartsville is compensatory only.

What are the advantages and disadvantages of both types? Do combined compensatory-incentive arrangements meet local needs more fully and/or create better public acceptance than simple compensatory plans? These and other questions about the functioning of these two types of arrangements need to be answered before a judgment about their relative effectiveness can be made.

The lack of detailed and explicit federal policy, except as previously indicated, on internalizing social costs has shifted the focus for new developments in this area to local and state jurisdictions faced with immediate siting problems. The siting permits being written by the Washington and Wyoming siting authorities[26] contain more comprehensive and detailed socioeconomic requirements than any presently in existence in the federal regulatory agencies. This fact lends some support to that provision of the proposed CEQ regulations and federal government's nuclear siting bill of 1978 wherein primary NEPA assessment and enforcement powers for environmental matters are delegated to the states.[27] The three mitigation plans discussed in this paper represent new policy directions in the search for more equitable distribution of the costs and benefits of energy development.

REFERENCES & NOTES

1. Whereas both the Skagit County Commissioners and the Washington Energy Facility Site Evaluation Council have jurisdiction over the proposed Skagit nuclear station, the EFSEC license was not received until January, 1977. Hence, this analysis is restricted to the conditions set by the Contract Rezone Agreement of 1974 between the Skagit County Commissioners and Puget Sound Power and Light.

2. For an excellent discussion of "Social and Environmental Costs of Energy Stystem," see article by Robert J. Budnitz and John P. Holdren pp. 553-580, in Annual Review of Energy, Jack Hollander and Melvin Simmons, (eds.), Vol. 1, 1976. Annual Reviews, Inc., Palo Alto, Calif. 94306.

3. Kapp, K. Wm., The Social Costs of Private Enterprise, Schocken Books, New York 1971, p. 13.

4. Cortese, Charles and Bernie Jones, "The Sociological Analysis of Boom Towns," Western Sociological Review, 8:1, 1977, pp. 76-90.

5. Smith, Courtland and Thomas Hogg, "Benefits and Beneficiaries: Contrasting Cultural and Economic Distinctions," Water Resources Research 7:2, pp. 254-263, April 1971.

6. Peelle, Elizabeth, "Social Effects of Nuclear Power Plants, in Social Impact Assessment, C. P. Wolf (ed.) Environmental Design and Research Association Conference proceedings (ERDA-5) Milwaukee, Wis. 1974.

7. See examples discussed in Rapid Growth from Energy Projects for Housing & Urban Development Agency, 1976 and Managing the Social and Economic Impacts of Energy Development, by Lawrence Susskind and Michael O'Hare for Energy Research and Development Agency, 1977, Washington, D.C.

8. Liroff, Richard, A National Policy for the Environment: NEPA and its Aftermath, 1976. Indiana University Press, Bloomington, Ind.

9. National Environmental Policy Act: Implementation of Procedural Provisions; Final Regulations, Council on Environmental Quality, Federal Register, Vol. 43, No. 230, Nov. 29, 1978. pp. 55978-56007.

10. NEPA's authority is, of course, considered supplementary to that of an agency's initial enabling legislation. In the case of the NRC, the Atomic Energy Act of 1954, Sect. 1.2b, describes the need "to protect the health and safety of the public."

11. Federal Power Commission, Virginia Electric and Power Company, Project #2716, Presiding Administrative Law Judge's Initial Decision Issuing License for the Bath County Pumped Storage Project, with conditions. September 20, 1976, p. 56; affirmed by FPC Opinion and Order, Jan. 10, 1977.

12. Watson, Keith, Esq., of Wald, Harkrader and Ross, Washington, D.C. in a letter to Elizabeth Peelle, November 8, 1976.

13. New York Times, July 27, 1976.

14. S. B. 1493, Energy Impact Assistance Act of 1978. 95th Congress, Second Session.

15. Atomic Safety and Licensing Board, Nuclear Regulatory Commission, Tennessee Valley Authority, Hartsville Nuclear Plant, Partial Initial Decision on Environmental and Site Suitability Aspects of the Facility, Making Determinations of Fact and Law Requisite for the issuance of a Limited Work Authorization. LBP-76-16, April 20, 1976.

16. Stimac, Michael V., "The Impact of Zoning on Nuclear Plant Siting," paper presented at Power Plant Siting Conference, American Nuclear Society and Oregon Chapter ANS, Portland, Oregon, August 1974.

Skagit Contract Rezone, Skagit County Commissioners, Skagit, Wash., 1974.

17. Site Certification Agreement for Skagit Nuclear Power Project Units 1 and 2 Between the State of Washington and Puget Sound Power and Light Company. Jan. 5, 1977.

18. Laramie River Station and Associated Facilities.
Industrial Siting Permit for Units 1, 2, and 3, Grayrocks Dam and Reservoir Docket WISA-75-3, Permit ISC-00-02-76.

Personal communication, Carl Ellis, WISA staff to Elizabeth Peelle, July 17, Sept. 26, Nov. 10, Nov. 12, 1976.

19. W. J. Finnegan, Director of Conservation and Environmental Affairs, in personal communication to Elizabeth Peelle, November 11, 1976; February 7, 1978.

20. Carl Ellis, personal communication to E. Peelle, Nov. 12, 1976.

21. Compare the "Avoid vs. Alleviate" strategy proposed by J. Gilmore, et al., in Socioeconomic Impact Mitigation Mechanisms in Six States, p. 22ff. Denver Research Institute, for Energy Research and Development Agency, 1977. Ray Gold, University of Montana, is credited by Gilmore with originating the concept in 1976.

22. For a discussion of the four principal inputs in a social impact assessment model, see B. Purdy, et al., A Post Licensing Case Study of Community Effects at Two Operating Nuclear Plants, ORNL/NUREG/TM-22, Sept. 1977.

23. Hartsville Nuclear Plants Socioeconomic Monitoring and Mitigation Reports, September 30, 1976; March 30, 1977; September 30, 1977; and March 31, 1978; Tennessee Valley Authority, Knoxville, Tenn., published April 1977; September, 1977; April, 1978; and September, 1978, respectively.

24. Annual Socioeconomic Impact Evaluation Report, Missouri Basin Power Project, Sept. 1, 1977, p. 23.

25. For another look at the Skagit agreement, see also David Myhra, Minimizing Adverse Socioeconomic Effects on Communities During the Construction of Nuclear Power Plants: Two Case Studies, presented at another session of American Nuclear Society meetings, November 14-19, 1976, Washington, D. C.

26. See, for example, the Wheatland permit or recently issued Washington State Site Certification Agreements for WPPSS 3 and 5 (Gray's Harbor County) October 27, 1976 or WPSS 1 and 4 (Hanford).

27. H. R. 11704, March 21, 1978 Nuclear Siting and Licensing Act of 1978.